# Variabilité spatiale des modèles ARPEGE & AROME pour les 3 sites

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Workshop MOSAi SIRTA 29-30 Mars 2022

# Variabilité spatiale AROME/ARPEGE

- Periode 1/6/2020 au 31/03/2021
  - AROME-sud-ouest couplé a l'AROME-oper même résolution 1.3km 90 niveaux (1er niveau à 5m) 2*16pts autour de Lannemezan et de Météopole flux
  - AROME-sirta : equivalent a AROME Sud-Ouest

  - ARPEGE 5.5km avec 105 niveaux (1er niveau à 10m) avec 20points de grille autour des 3 sites
  - Sortie en NetCdf pas de temps horaire, flux de surface, tous les niveaux verticaux disponibles.

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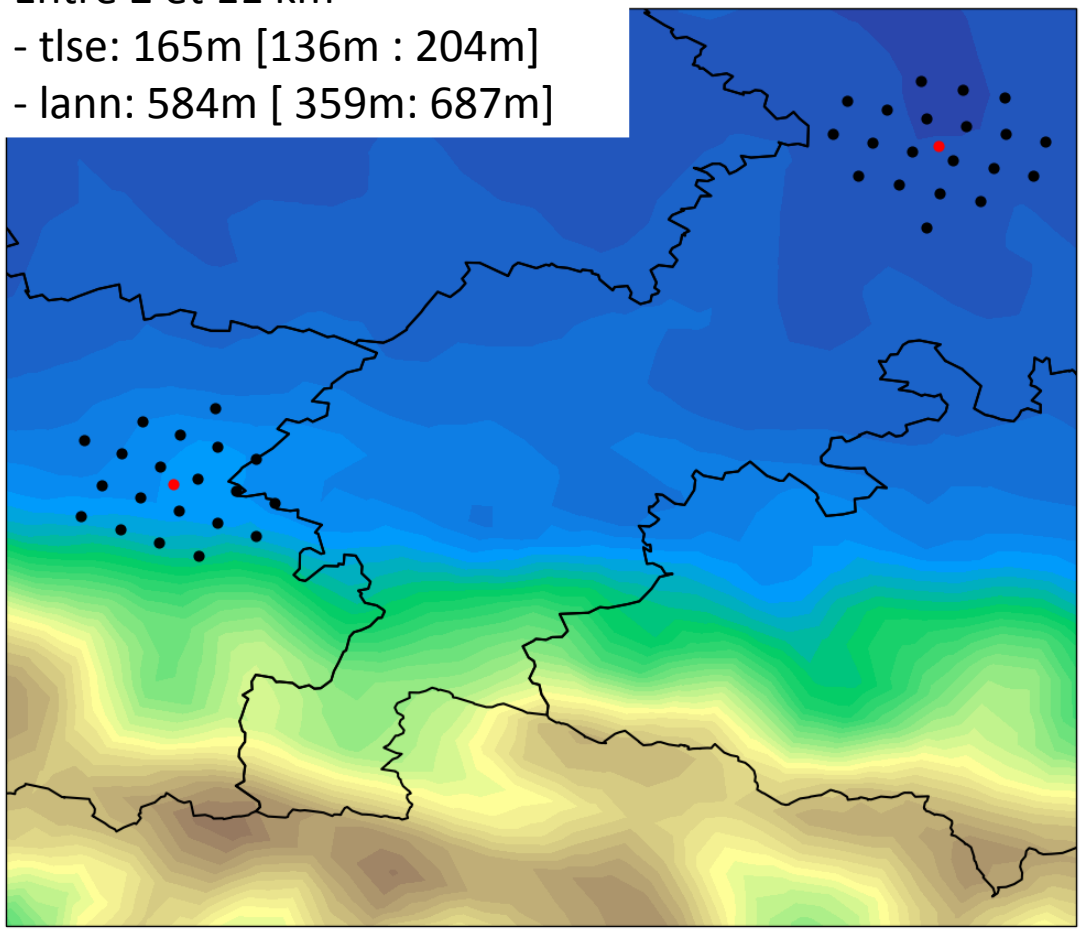
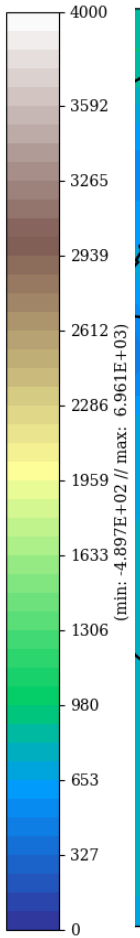
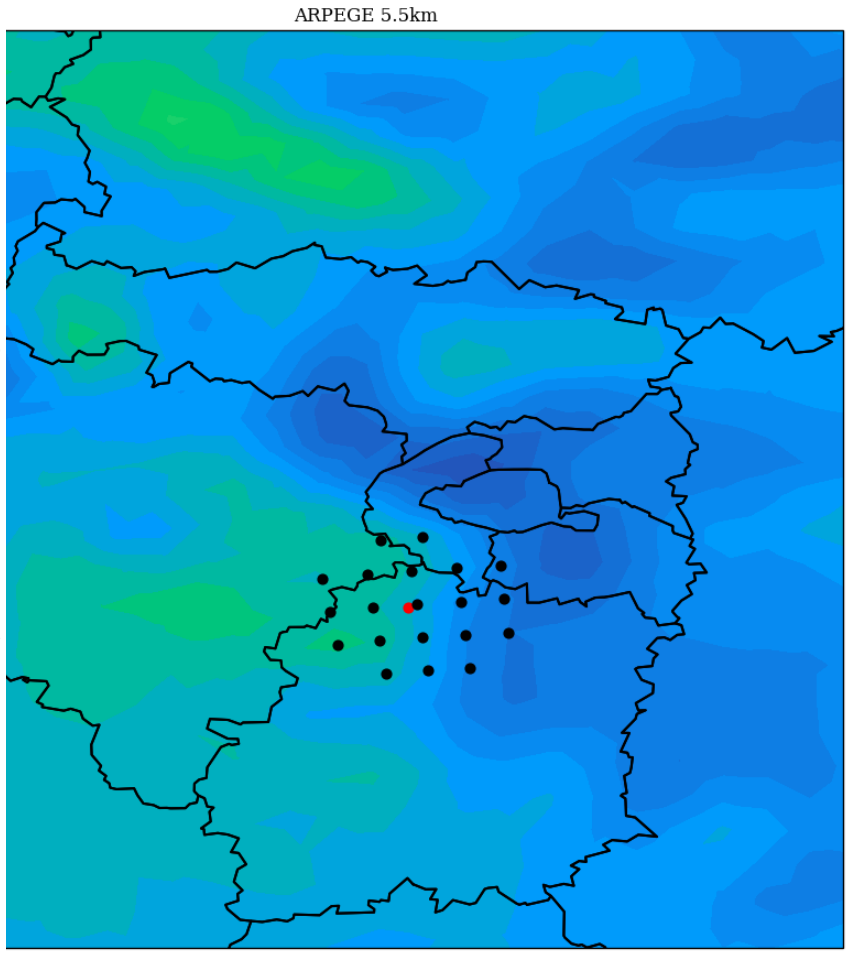
# Relief ARPEGE: Lannemezan, Toulouse et Sirta

Niveaux: 10, 32, 56, 82, 110m

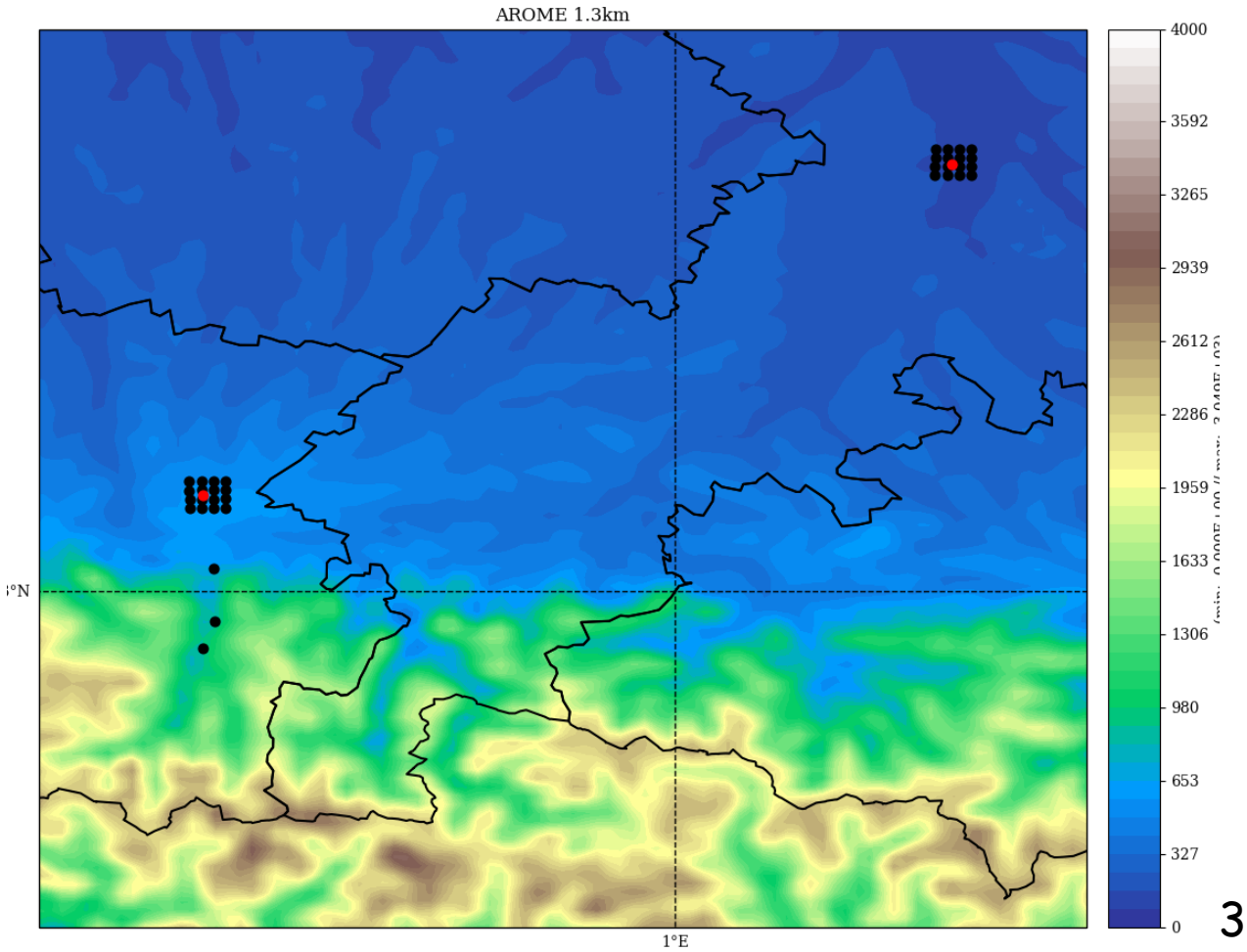
Entre 2 et 11 km
- tlse: 165m [136m : 204m]
- lann: 584m [ 359m: 687m]





# Relief AROME autour Lannemezan et Toulouse




- tlse: 165m [152m : 165m]
- lann: 584m [ 558m: 887m]

Niveaux: 5, 17, 33, 53, 76,102 m

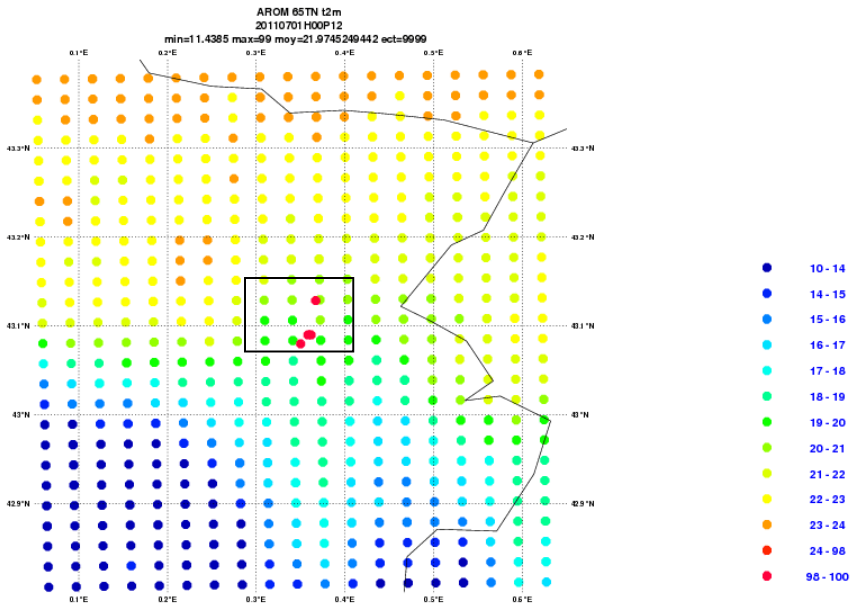
30 Mars 2022

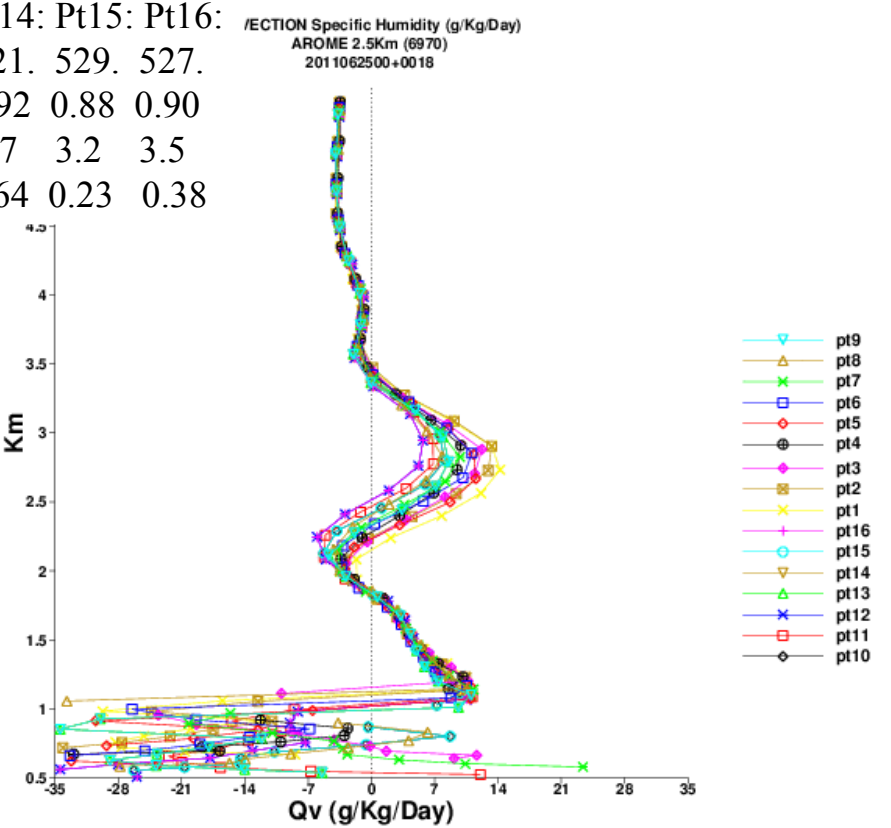
# Variabilité dans AROME lors de BLLAST

**AROME**

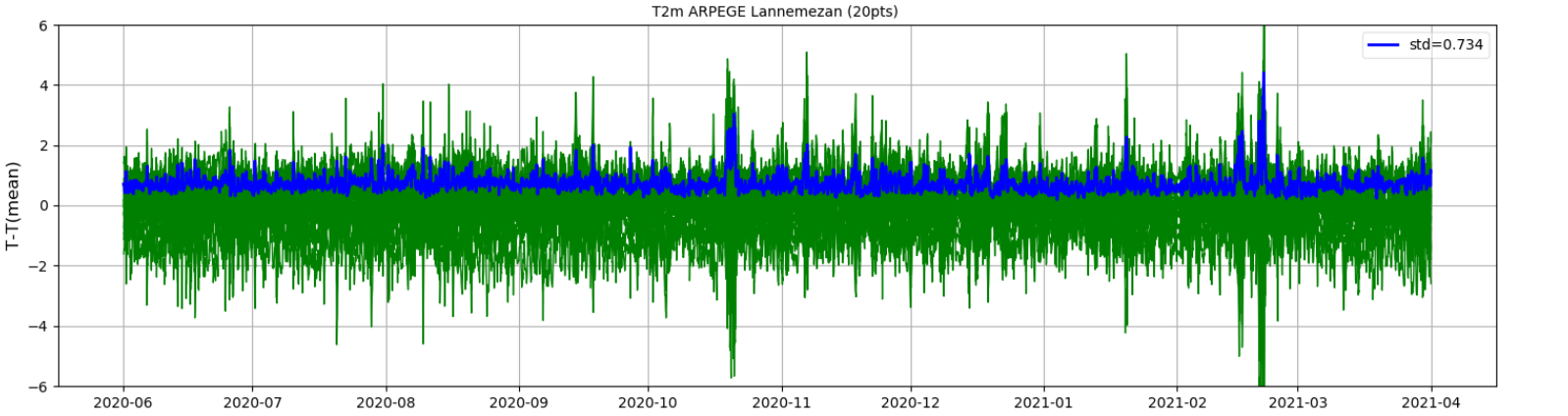
**Workshop BLLAST/ Wageningen, 8-9 February 2016**

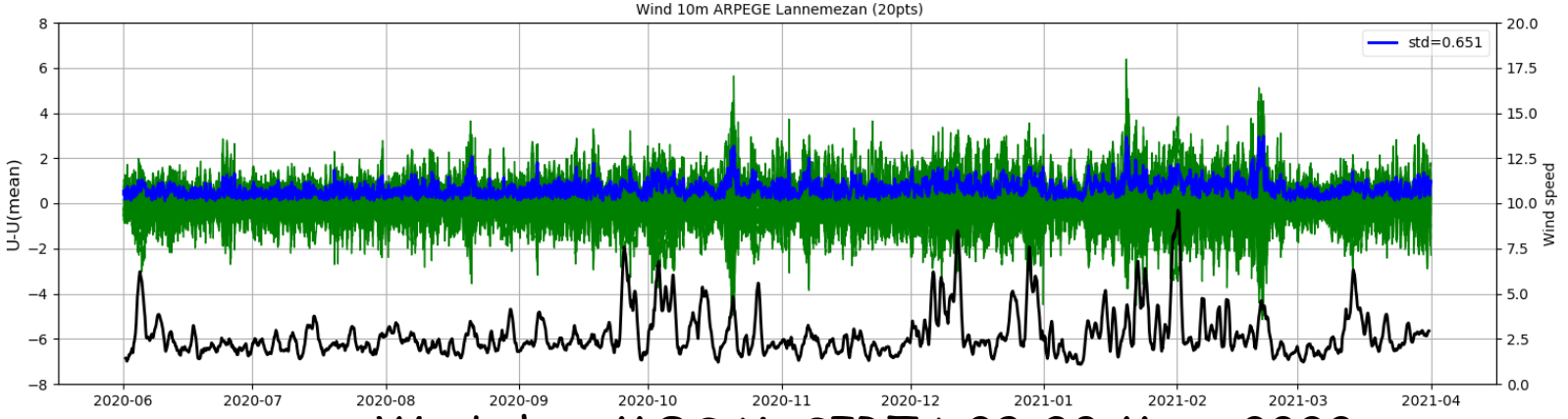
| | Pt1: | Pt2: | Pt3: | Pt4: | Pt5: | Pt6: | Pt7: | Pt8: | Pt9: | Pt10: | Pt11: | Pt12: | Pt13: | Pt14: | Pt15: | Pt16: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alt: | 535. | 611. | 595. | 558. | 552. | 605. | 609. | 593. | 532. | 567. | 579. | 575. | 505. | 521. | 529. | 527. |
| Veg: | 0.95 | 0.93 | 0.92 | 0.92 | 0.92 | 0.93 | 0.85 | 0.94 | 0.93 | 0.91 | 0.91 | 0.91 | 0.93 | 0.92 | 0.88 | 0.90 |
| LAI: | 3.4 | 3.5 | 3.2 | 3.4 | 3.5 | 3.4 | 3.3 | 3.2 | 3.5 | 3.7 | 3.3 | 3.5 | 3.8 | 3.7 | 3.2 | 3.5 |
| Zo: | 0.78 | 0.53 | 0.26 | 0.16 | 0.24 | 0.38 | 0.45 | 0.39 | 0.49 | 0.37 | 0.18 | 0.47 | 0.83 | 0.64 | 0.23 | 0.38 |



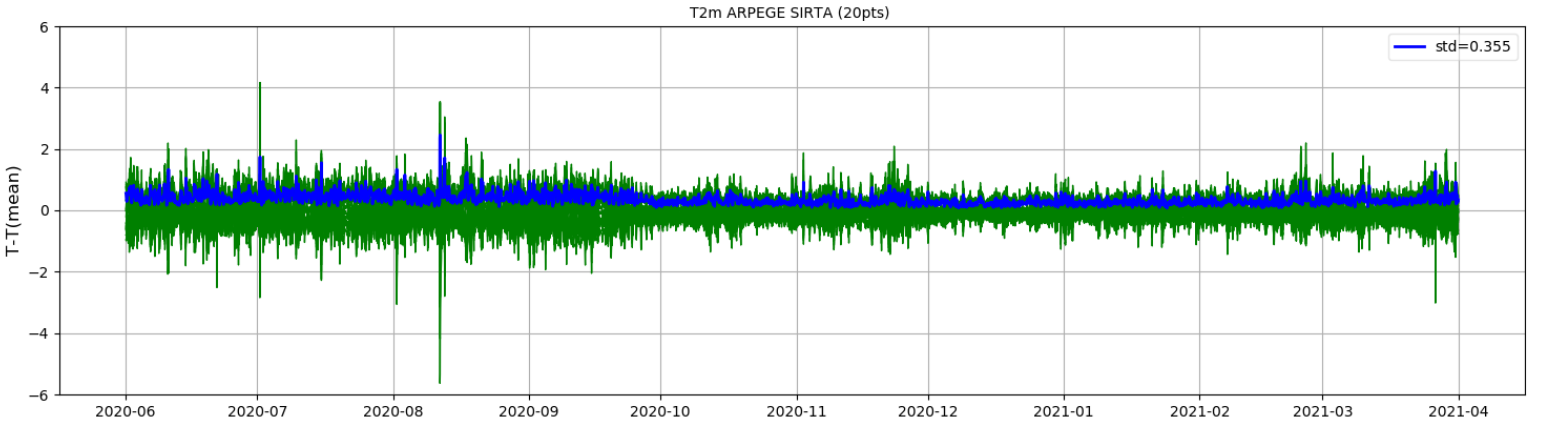



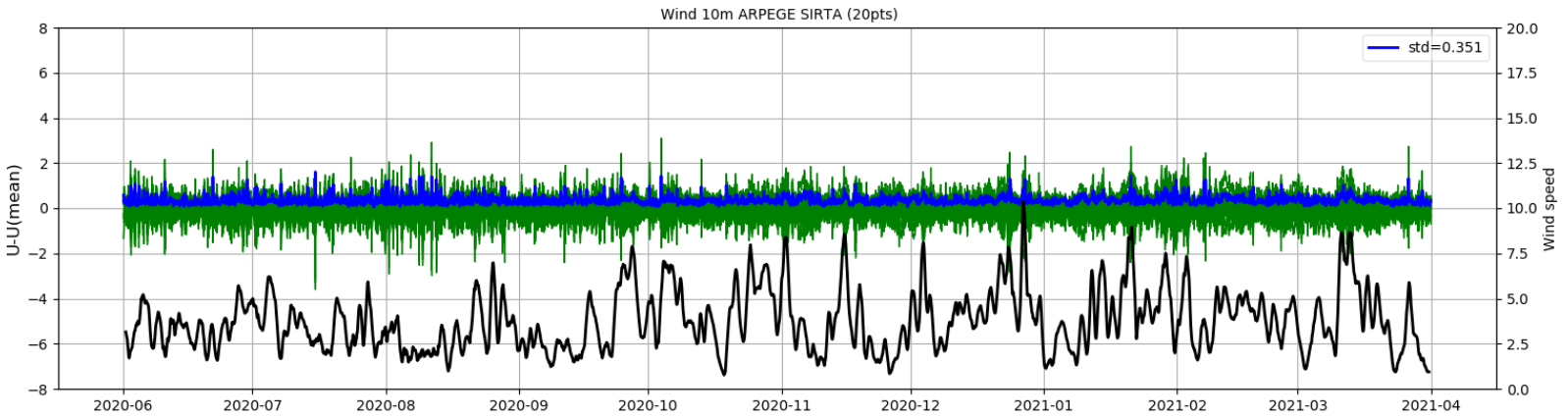
# T2m et Vent 10m variabilité  20pts ARPEGE (Lannemezan)



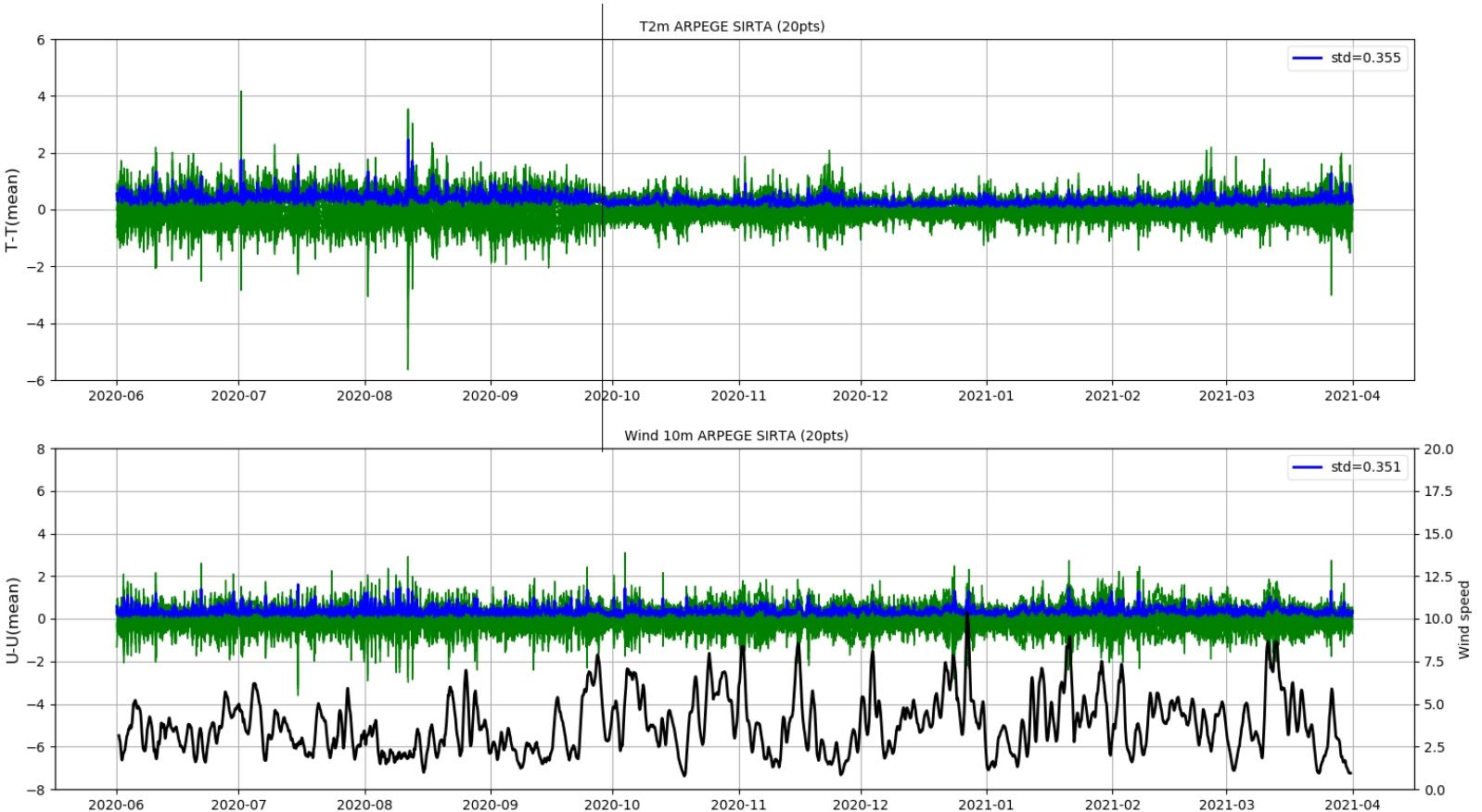



# T2m et Vent 10m variabilité 20pts ARPEGE (SIRTA)

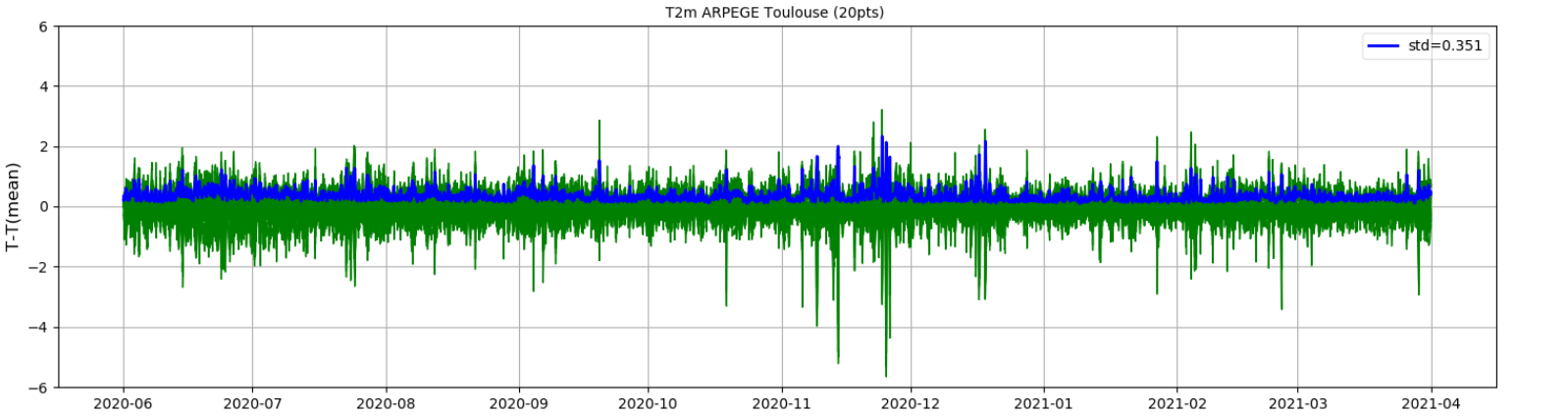


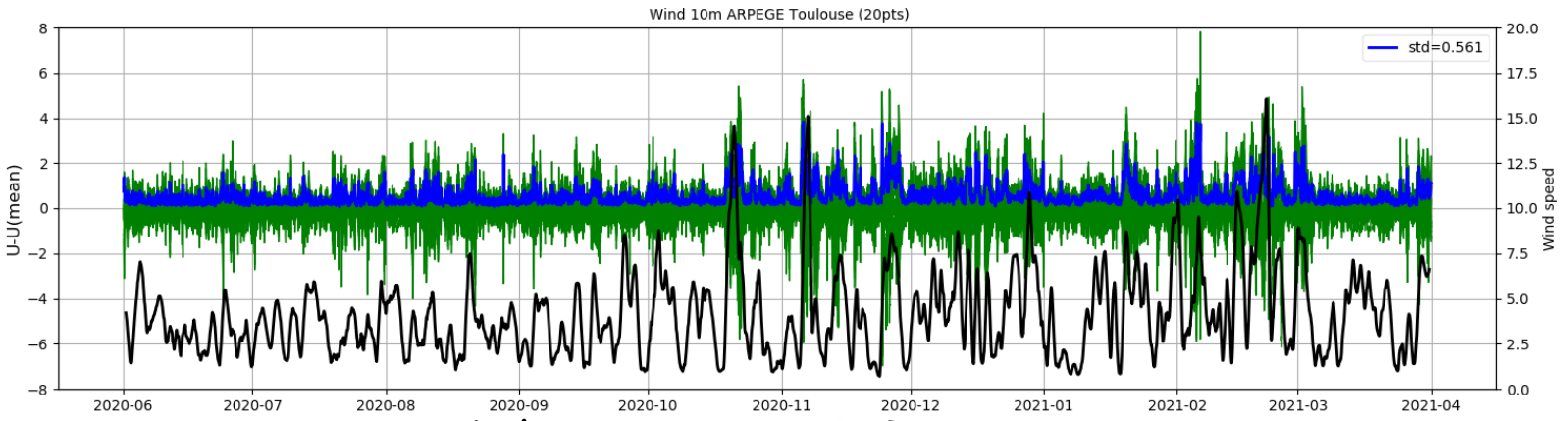



# T2m et Vent 10m variabilité 20pts ARPEGE (SIRTA)

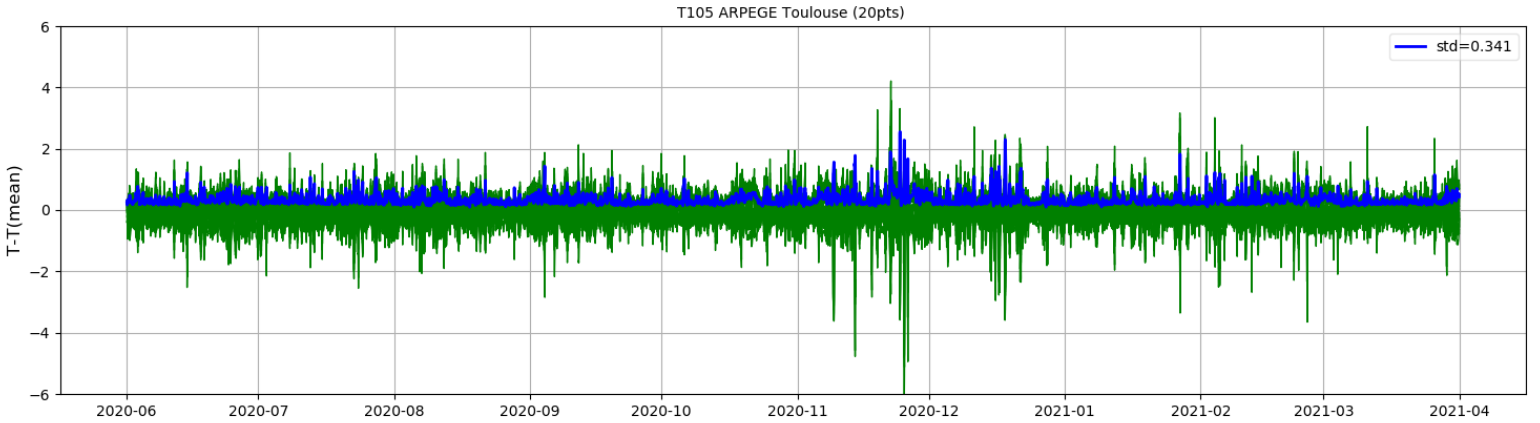


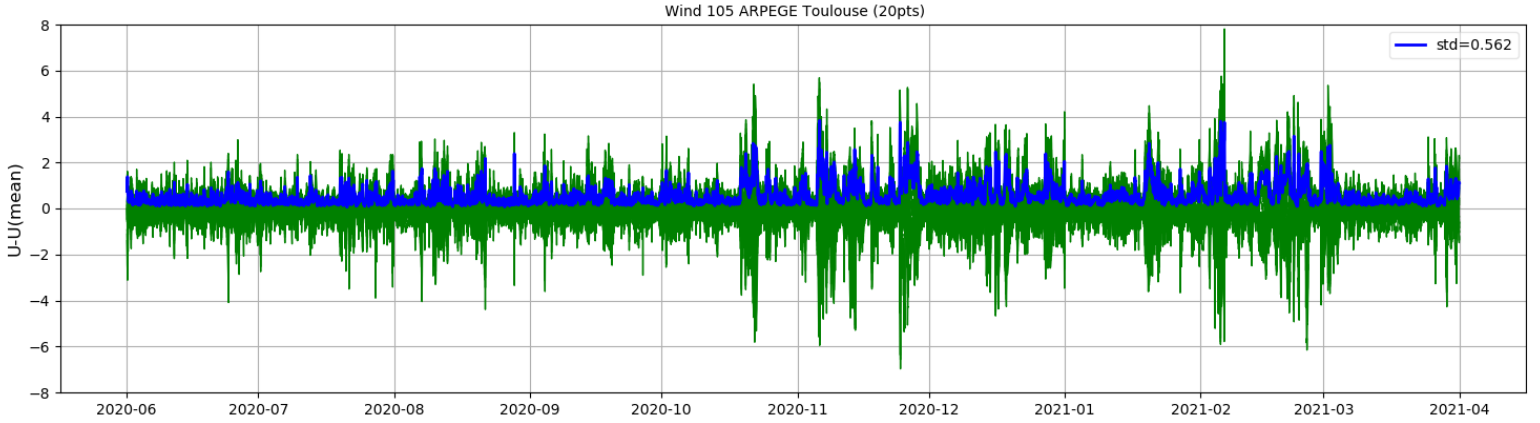
# T2m et Vent 10m variabilité 20pts ARPEGE (Toulouse)



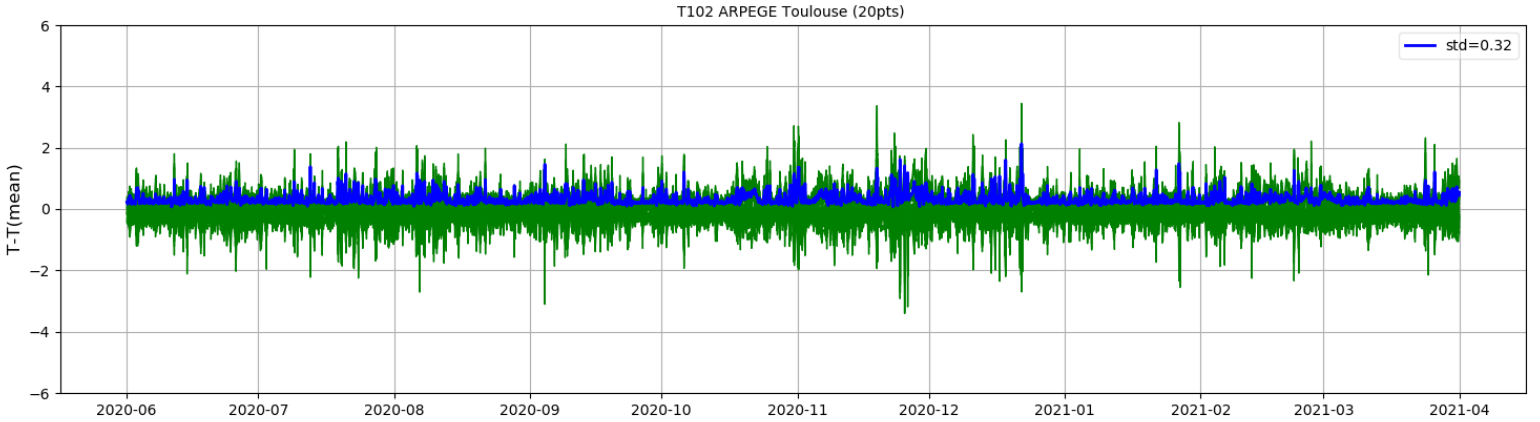



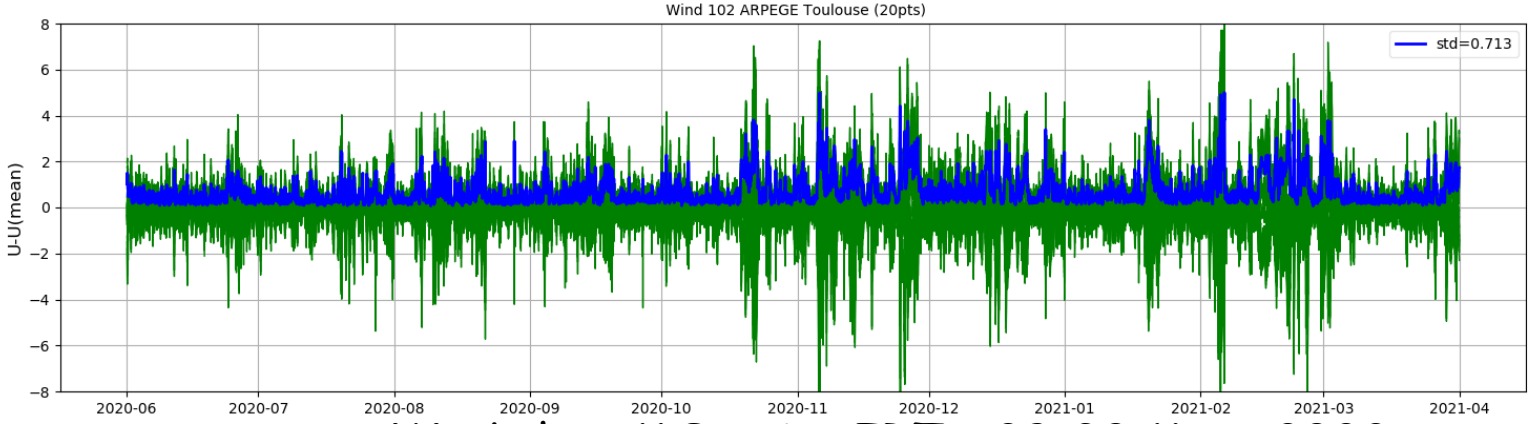
# T et Vent Lev=105 ~ 10m variabilité  20pts ARPEGE (Toulouse)



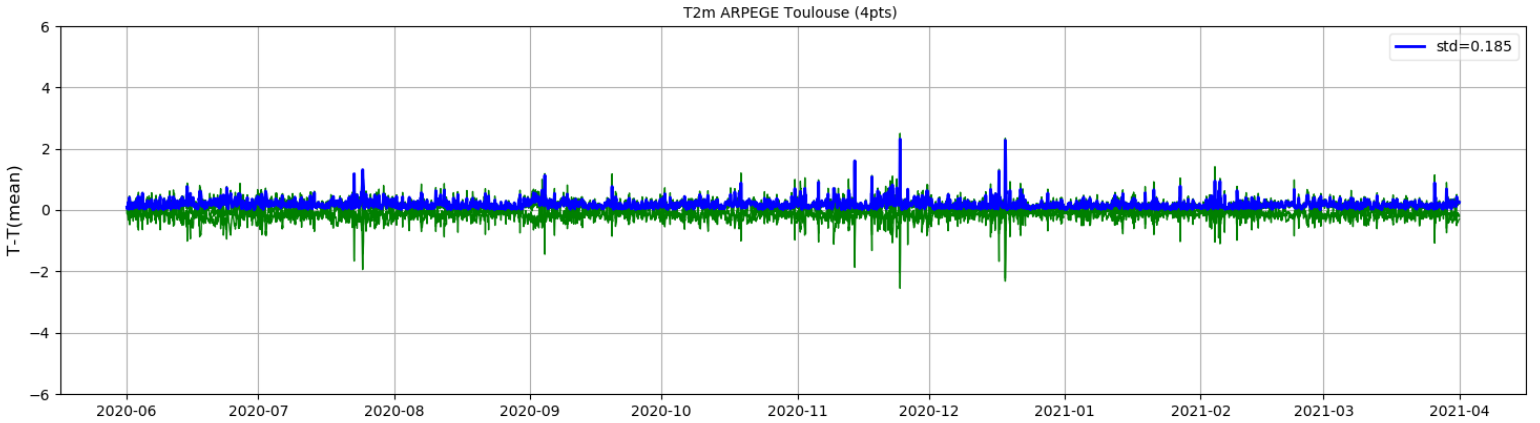



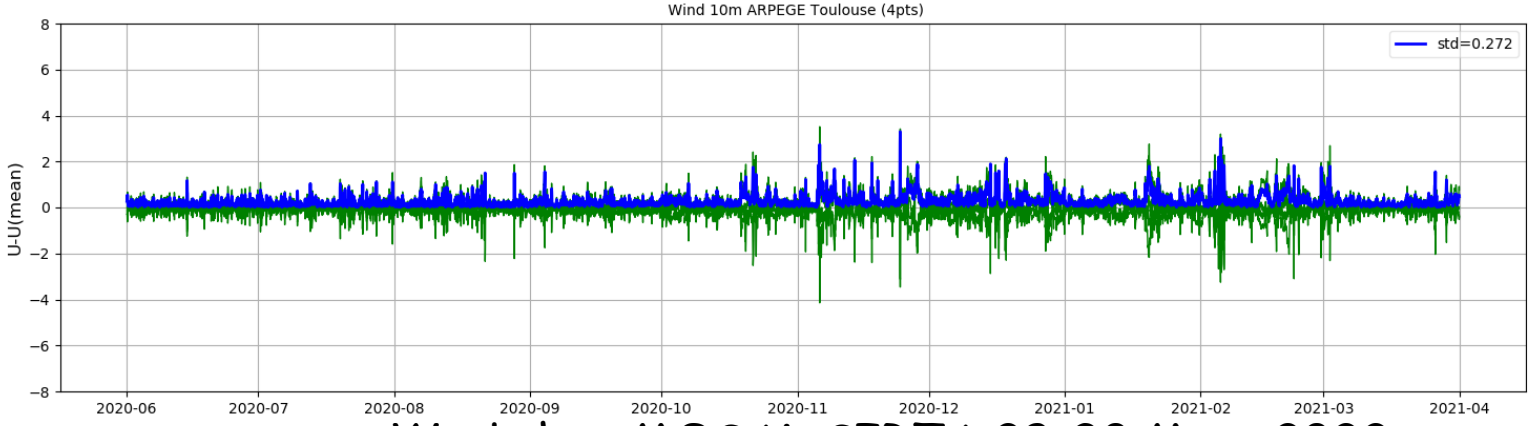
# T et Vent Lev=102 ~ 82m variabilité 20pts ARPEGE (Toulouse)



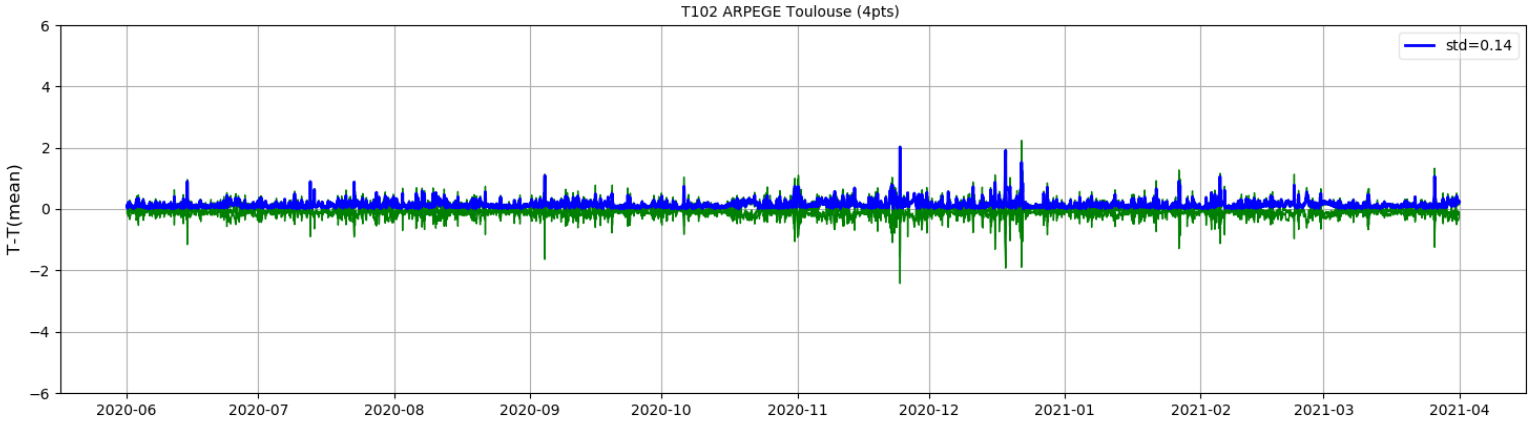



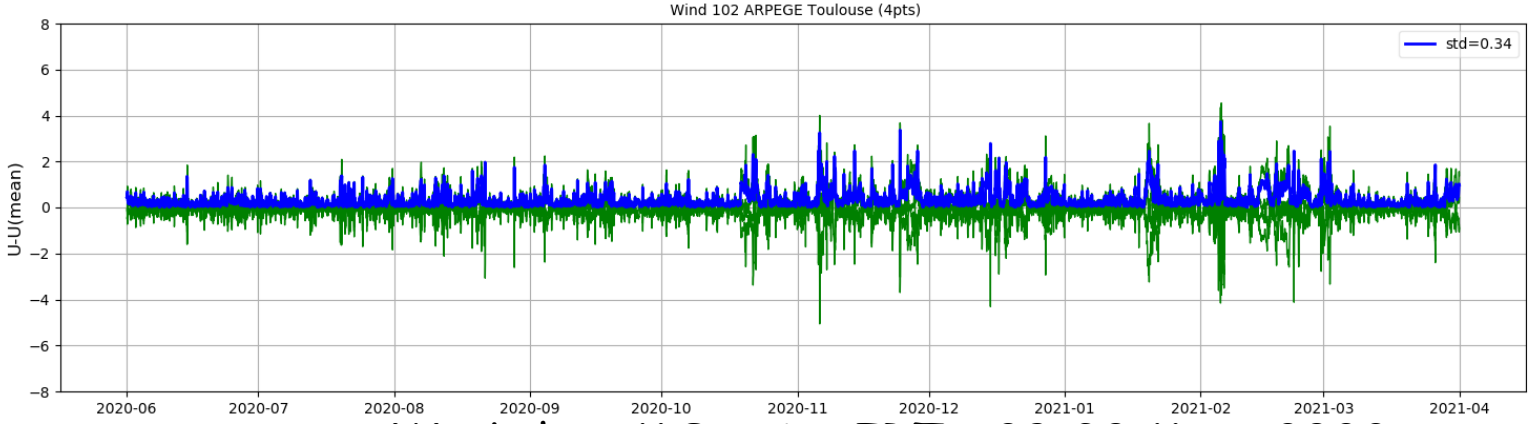
# T2m et Vent 10m variabilité  4pts ARPEGE (Toulouse)



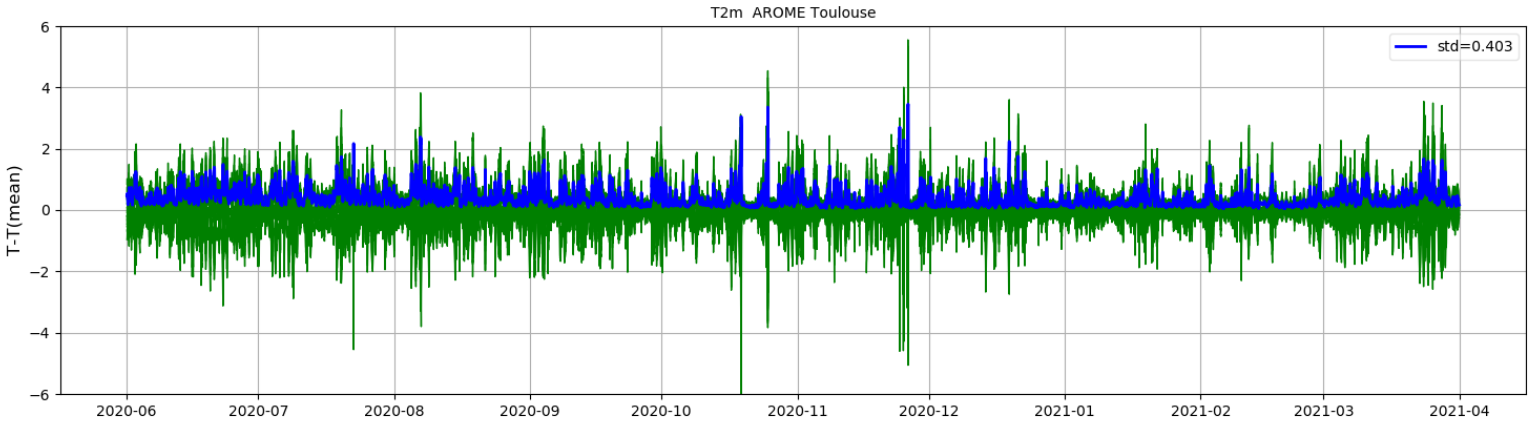



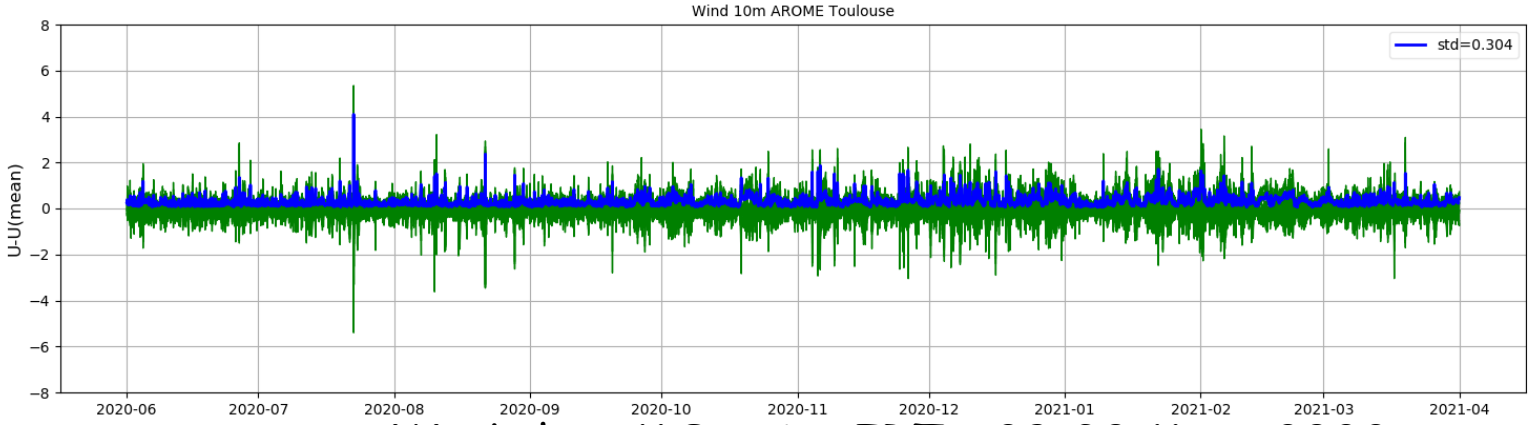
# T et Vent Level=102 ~82m variabilité  4pts ARPEGE (Toulouse)



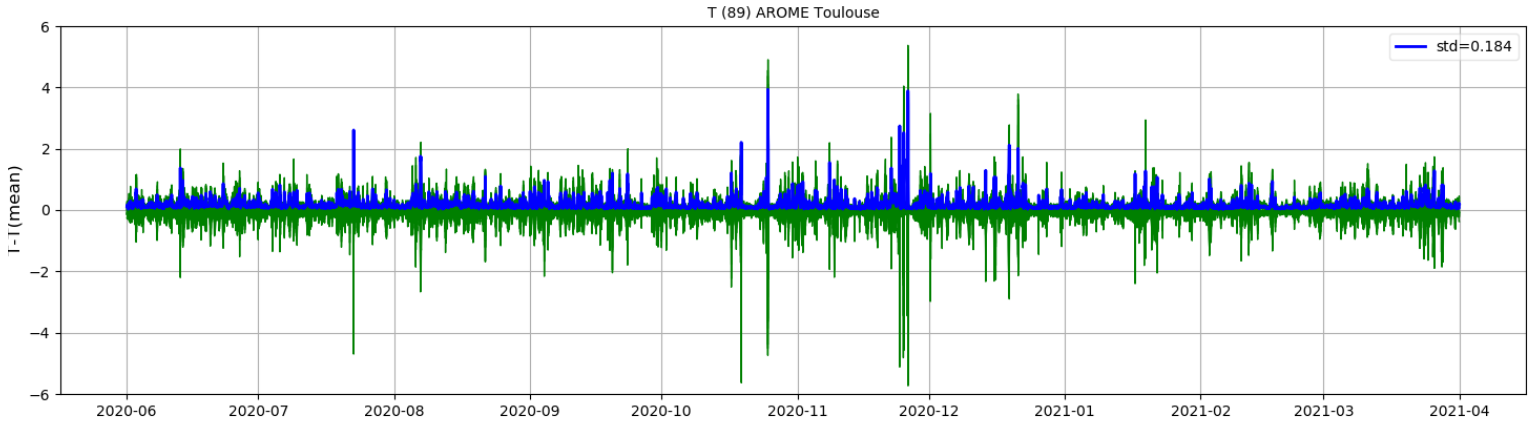



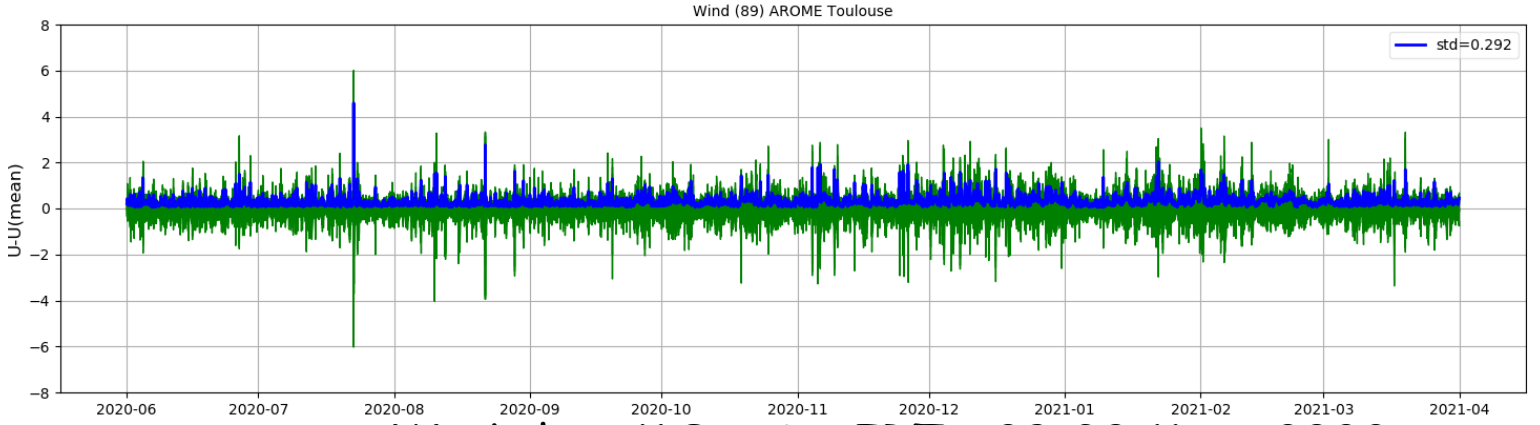
# T2m et Vent 10m variabilité 16pts AROME (Toulouse)



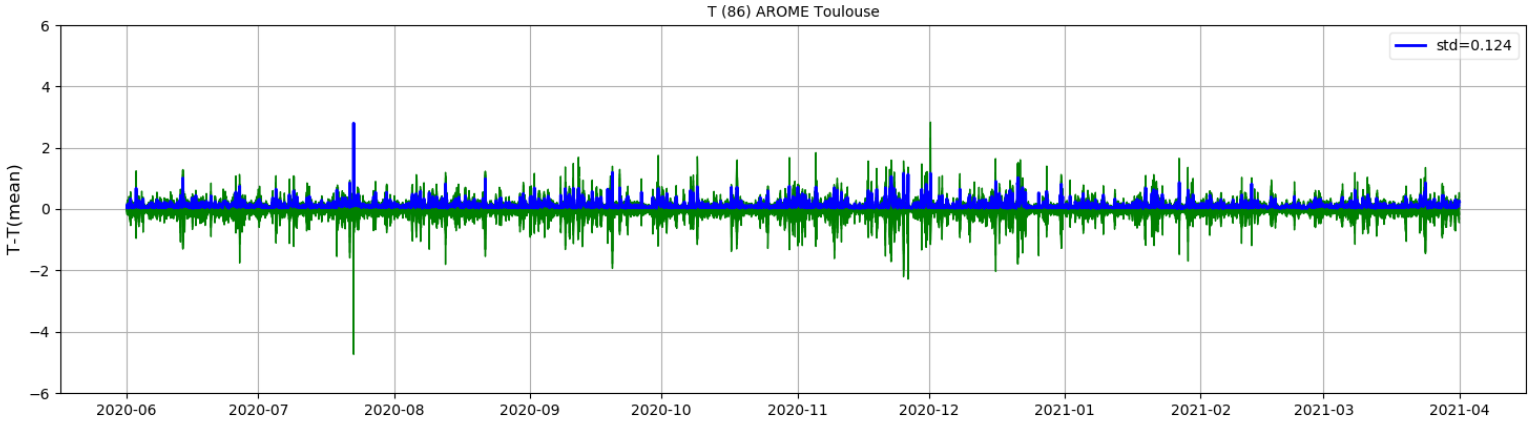



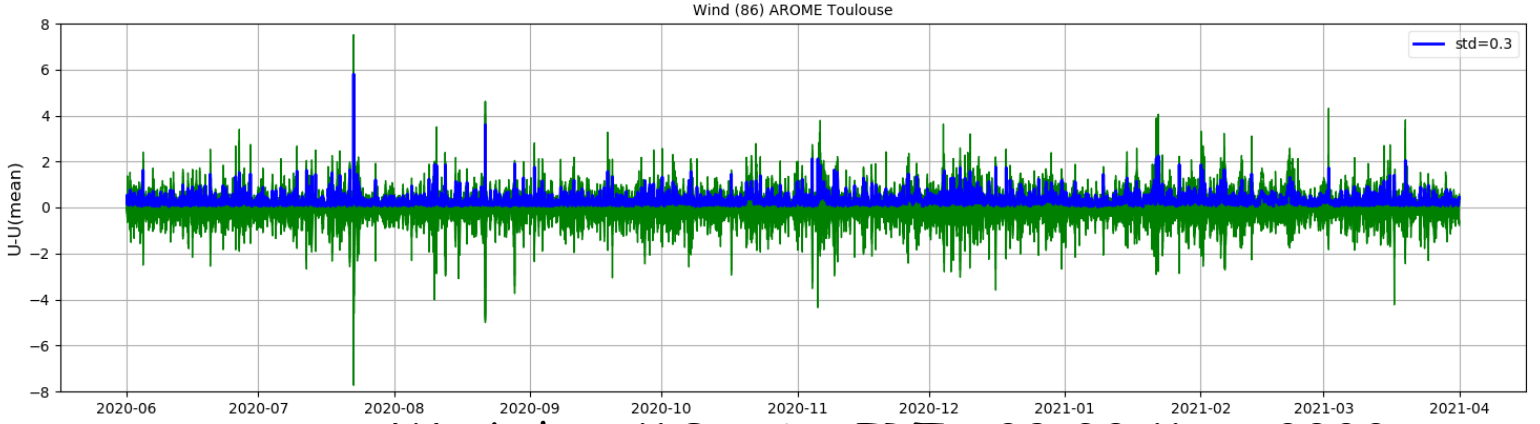
# T et Vent ~17m variabilité 16pts AROME (Toulouse)



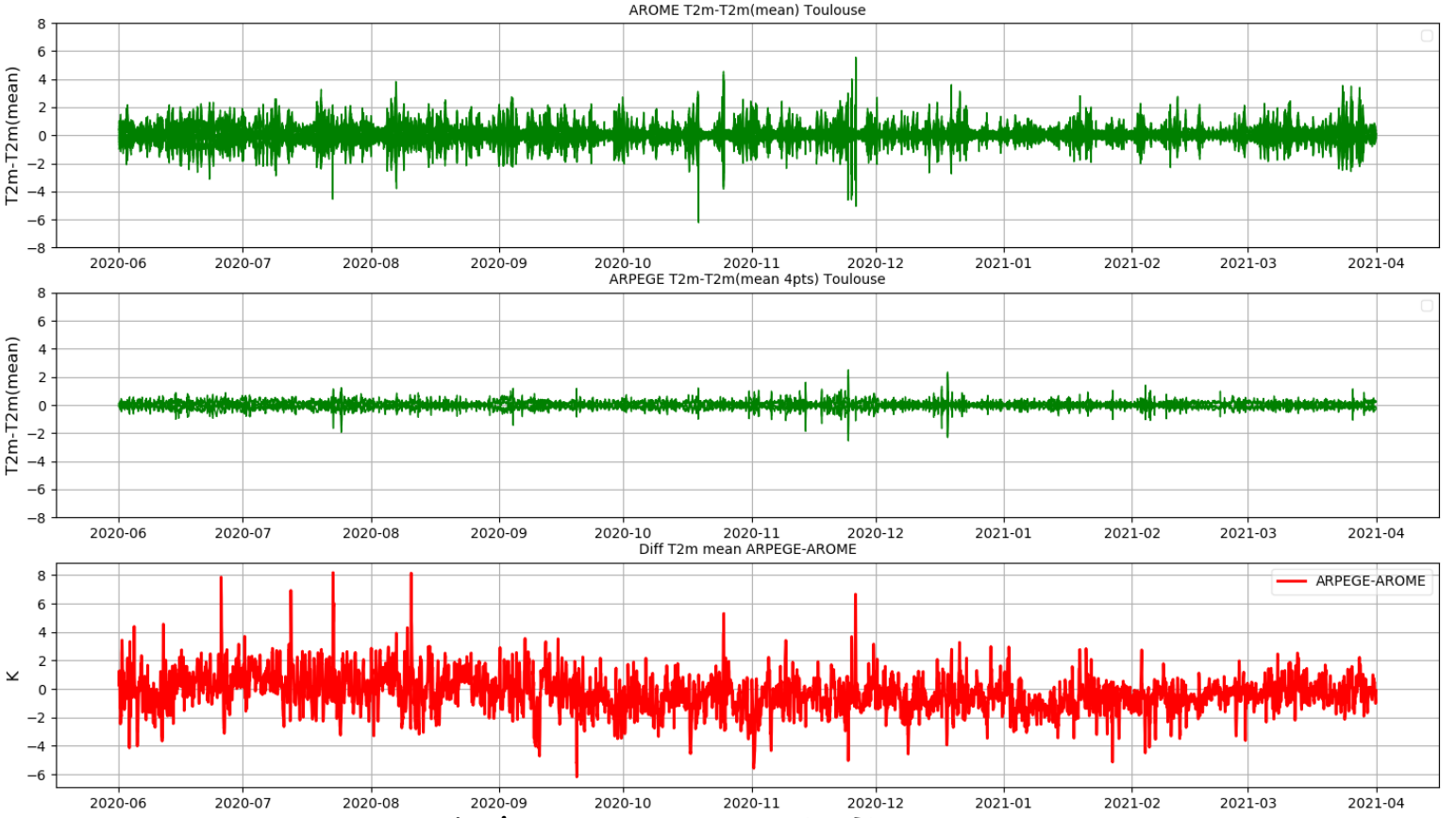



# T et Vent ~76m variabilité 16pts AROME (Toulouse)

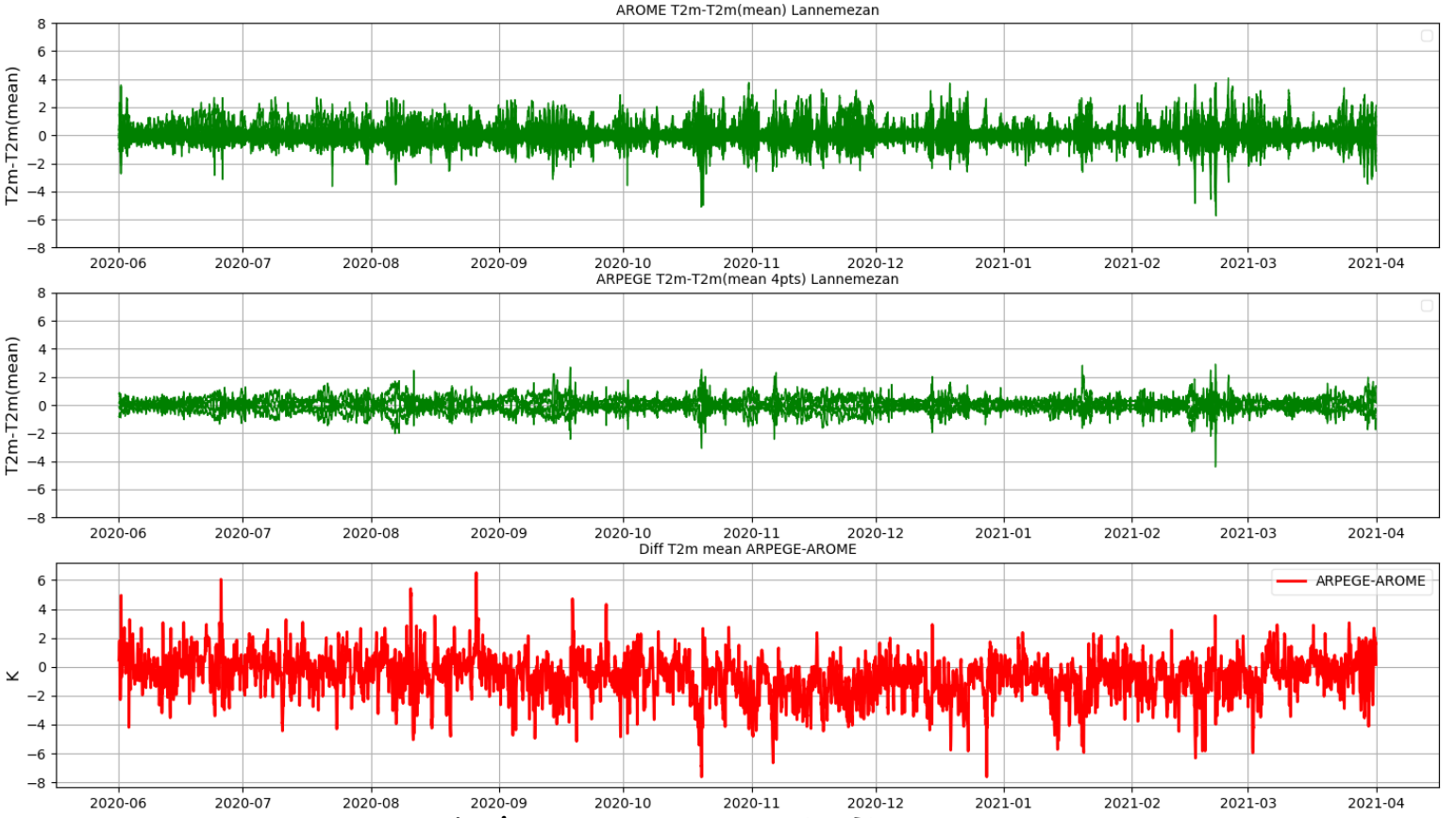


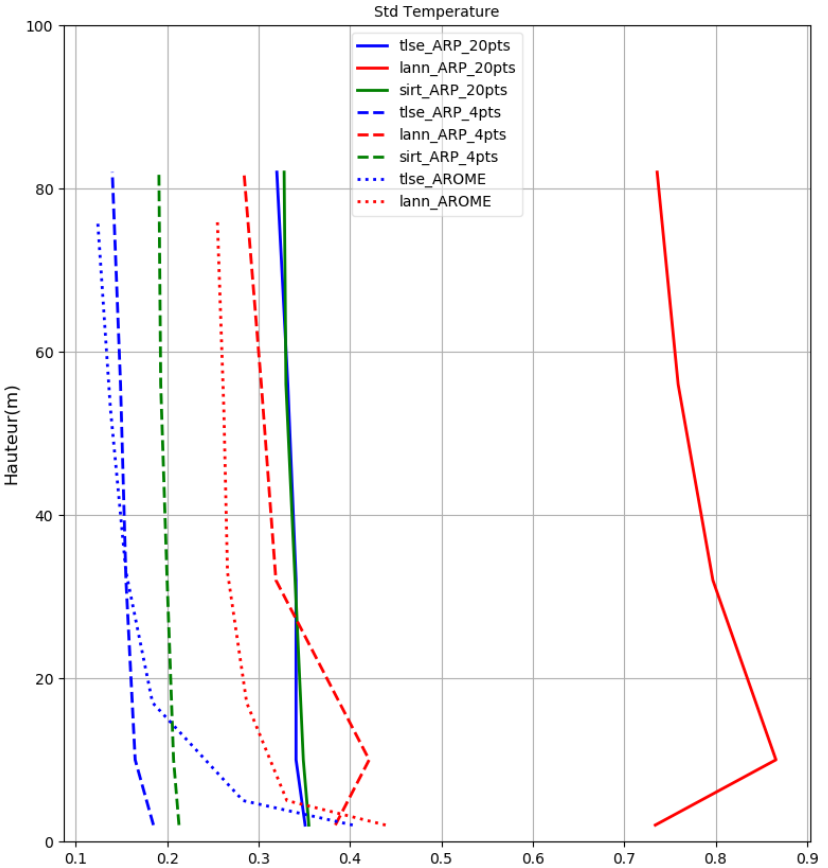
# Moyenne AROME – ARPEGE (4pts) Toulouse

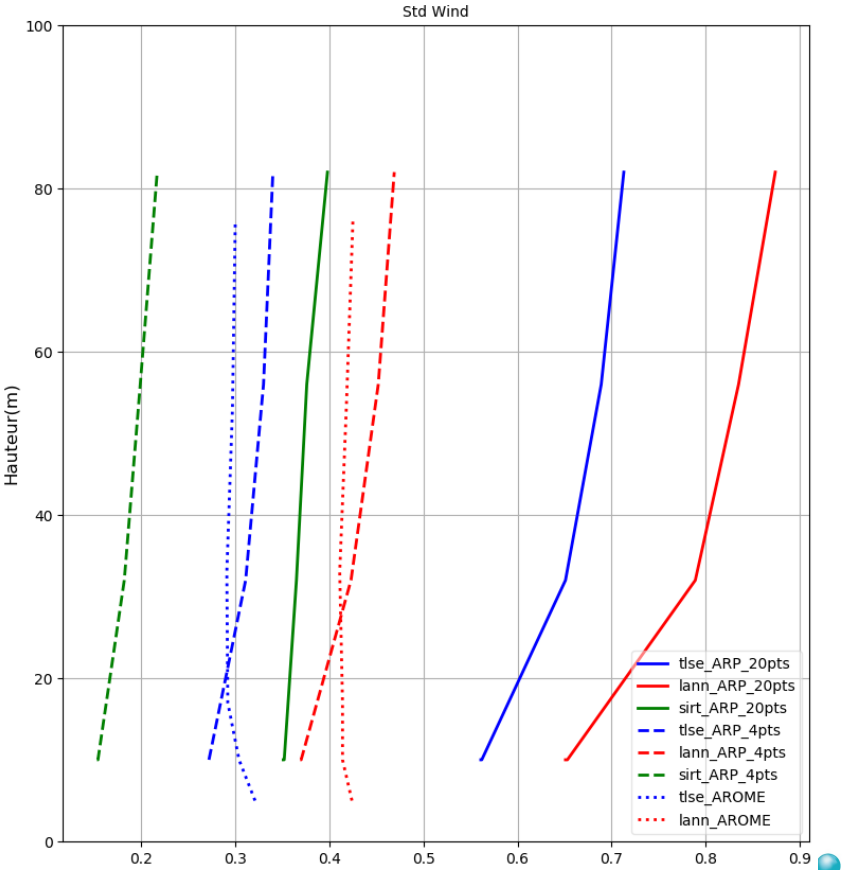


# Moyenne AROME – ARPEGE (4pts) Lannemezan

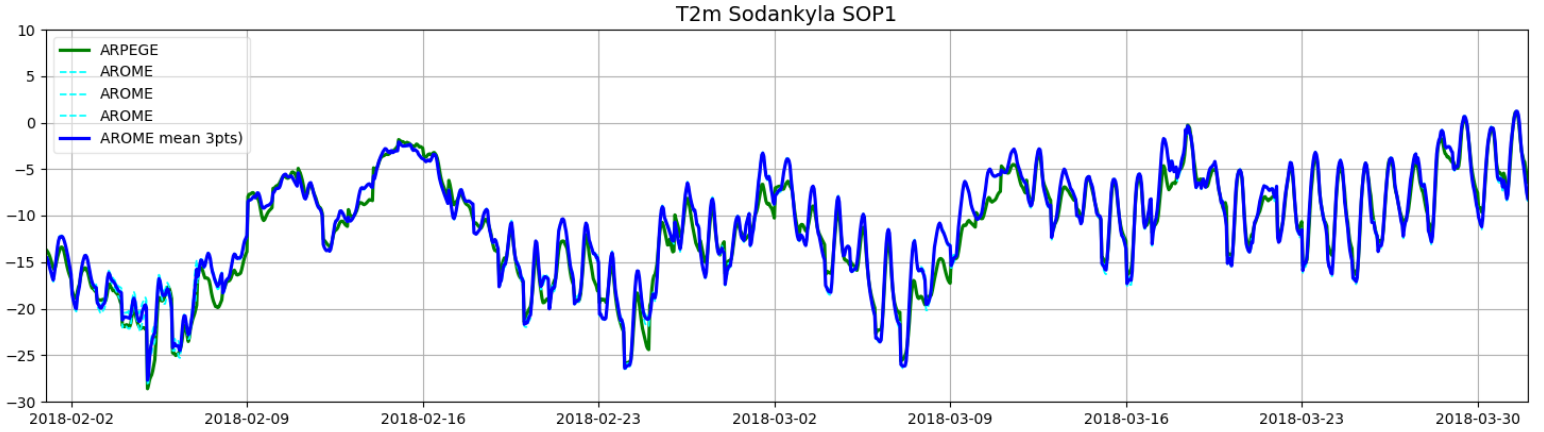


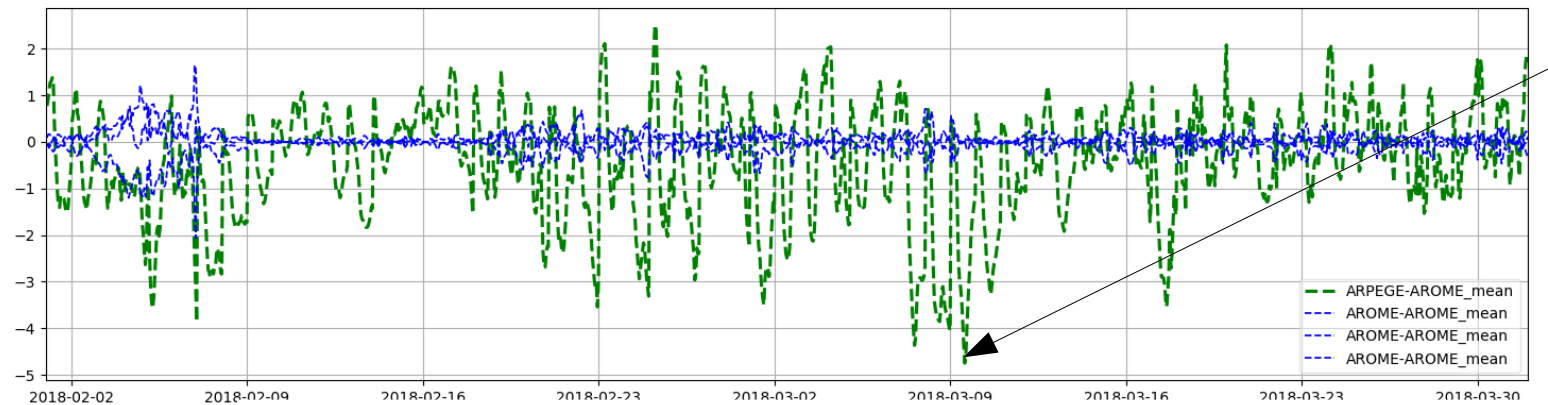
# Evolution de la std sur la verticale



# Spatial variability in AROME and comparison with ARPEGE (YOPP)

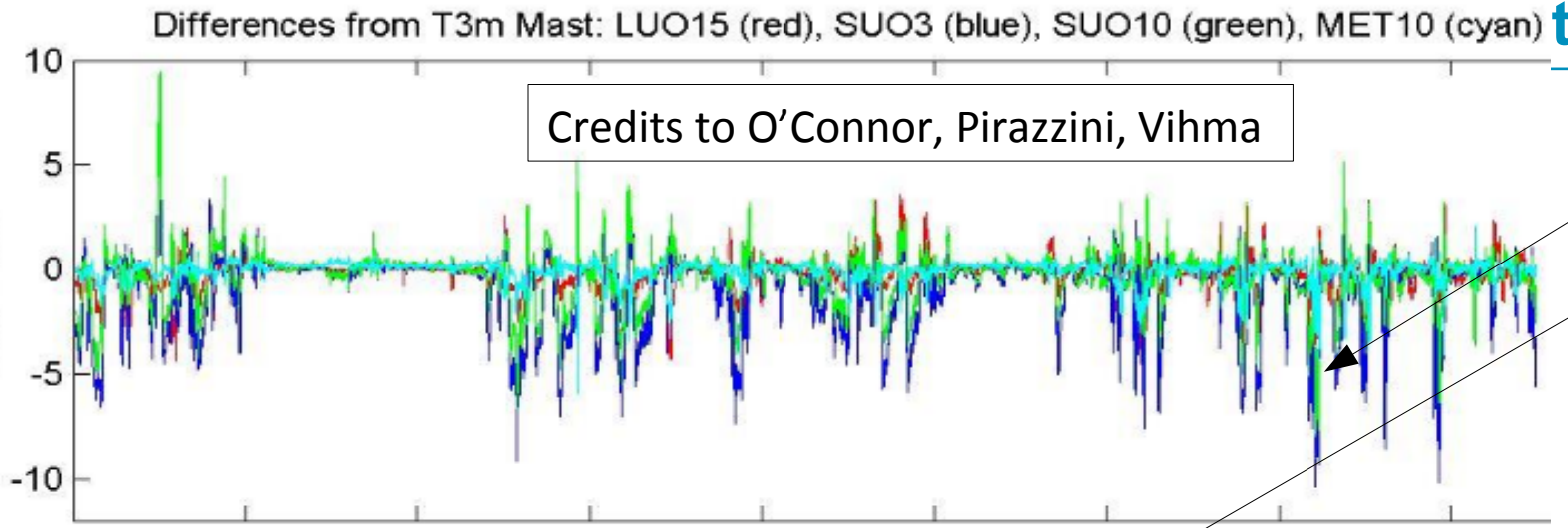


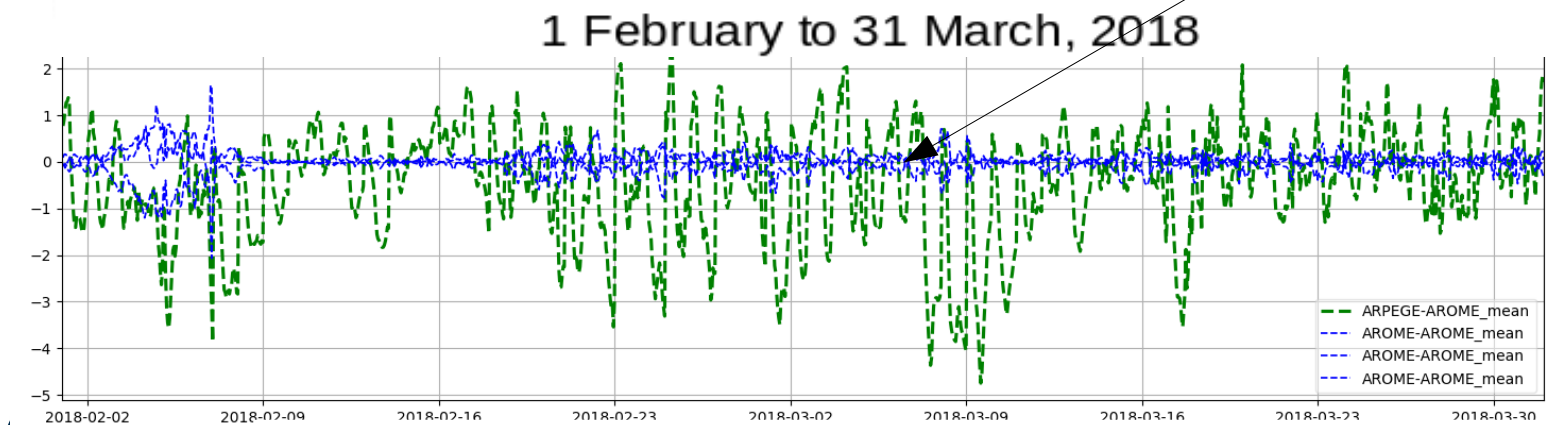

## Sodankyla SOP1

- AROME: 3 land-points (dashed cyan) around Sodankyla (zorog 189m-201m)
- Very similar results between ARPEGE (199m) and AROME except for some days.
- Differences between ARPEGE and AROME-mean (green line) < 5K
- Spatial variability between the 3 AROME points is less than 1K

# th ARPEGE



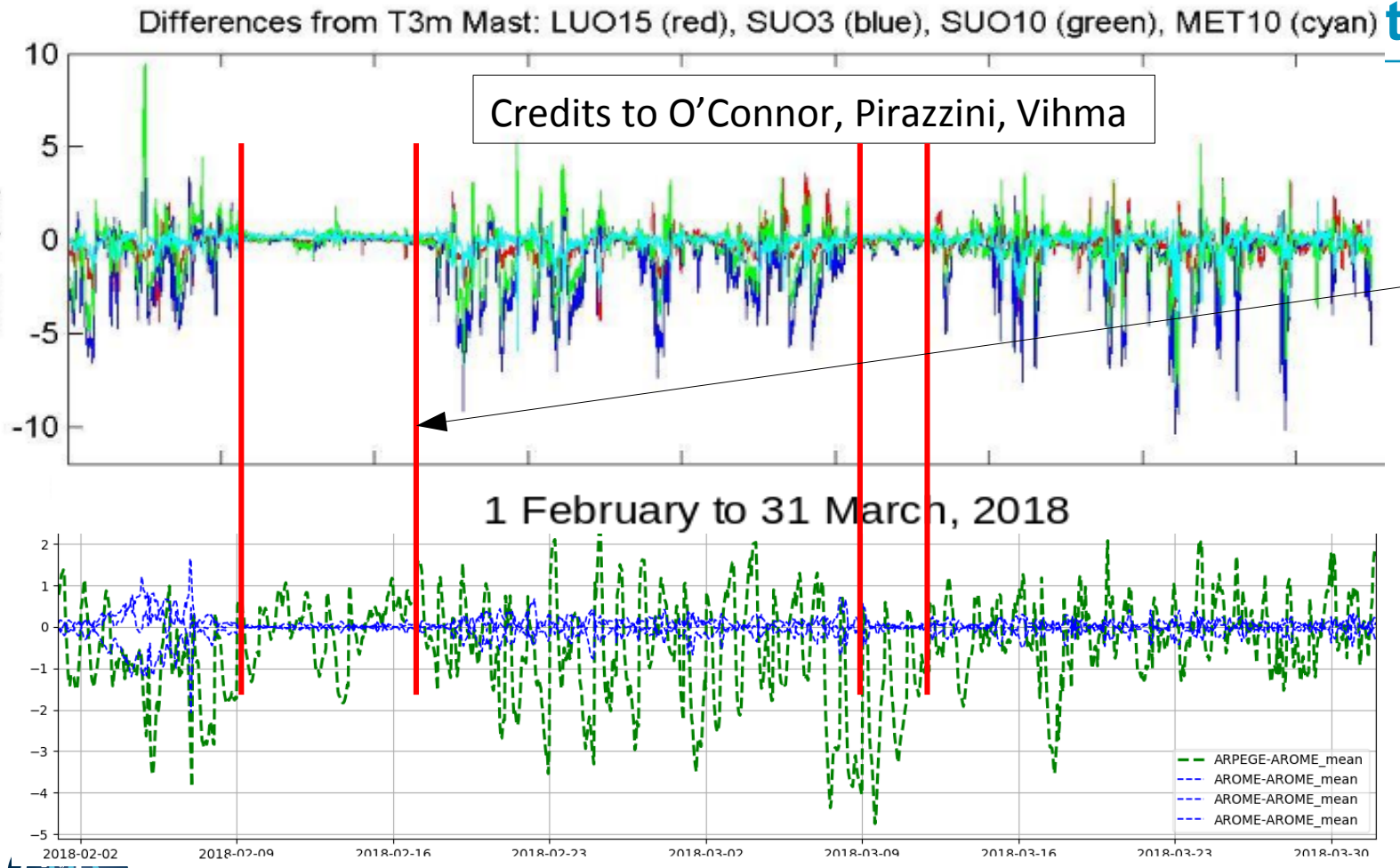

Credits to O'Connor, Pirazzini, Vihma




**Sodankyla SOP1**

- More spatial variability in the observation than in AROME (blue line) at 2.5Km.

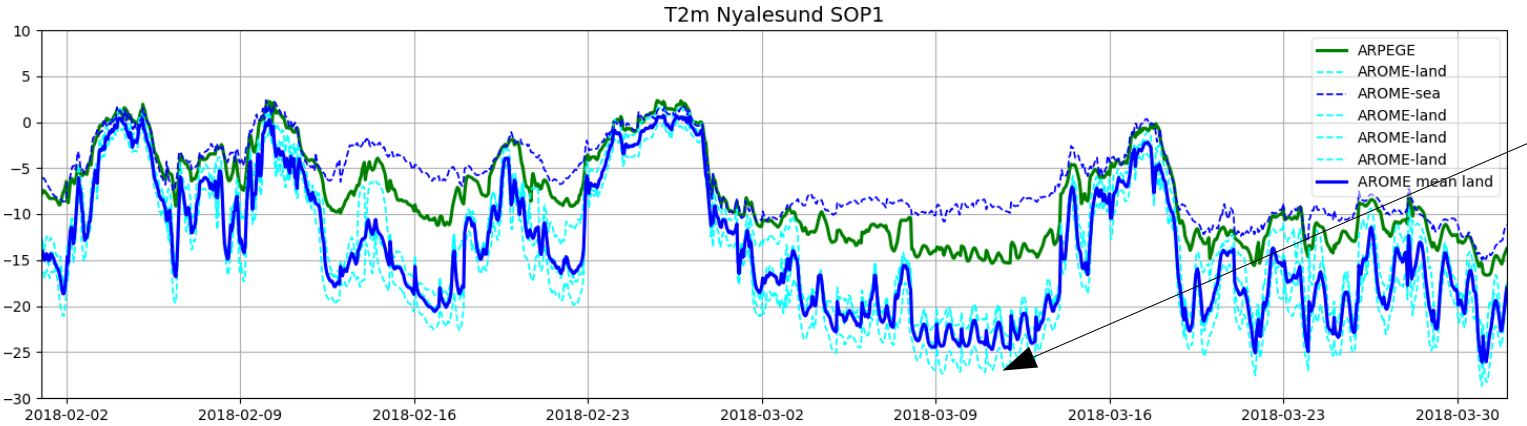
# th ARPEGE

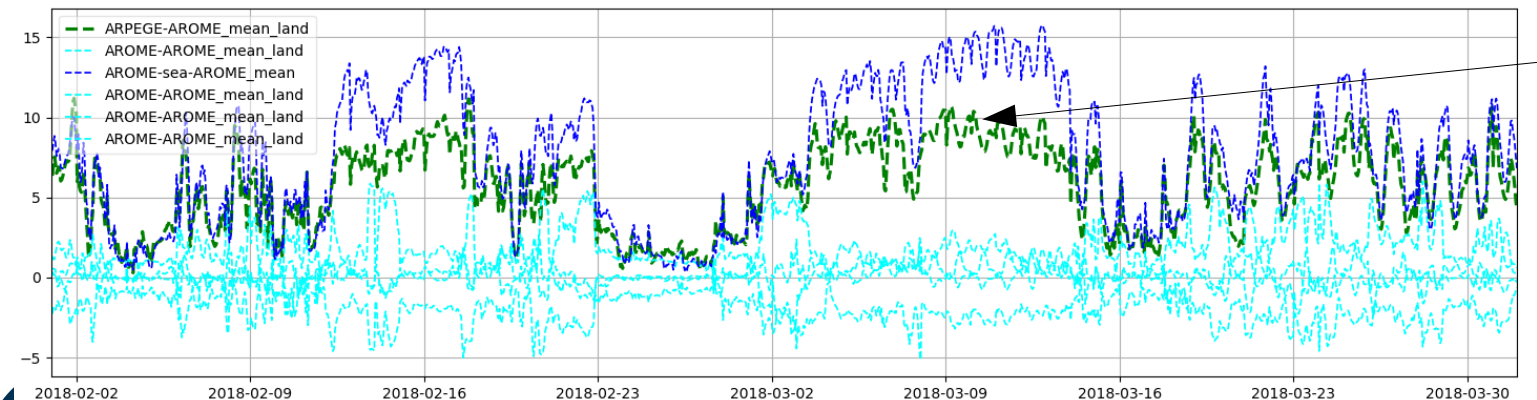



**Sodankyla SOP1**

- More spatial variability in the observation than in AROME at 2.5Km.
- Good agreement for some periods.
- Some periods can be re-run with AROME @ 1.25Km with 90 vertical levels with a first level at 5m (instead of 2.5km and 65 levels, 1st level 10m). Can we found the same order of spatial variability seen in the obs ?

# Spatial variability in AROME and comparison with ARPEGE (YOPP)




## NyAlesund SOP1

- AROME: 4 land-points (dashed cyan) around Nyalesund (zorog 37m-309m) and one sea-point (dashed blue).
- ARPEGE: orography for NyAlesund = 41m

- Differences between ARPEGE and AROME-mean-land (green line) up to 10K.
- Spatial variability between the 4 AROME land point up to 5K

# La suite ...

- relation std (variabilité) de T, Vent, TKE (?) avec force du  vent , hauteur pour ARPEGE et AROME sur les 3 sites. Std = fct (Ws, H, Km2, z0, ...)

- Comment comparer des modèles de différentes résolutions aux obs ? ARPEGE (4pts) , AROME (16pts) ?

- Format fichier pour YOPP (Year Of Polar Prediction)
  - Merged Model Data Files (MMDF) and Merged Observatory Data File (MODF).
  - https://www.polarprediction.net/key-yopp-activities/yoppsitemip/

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